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(71) Applicant (*for all designated States except US*): **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; New Orchard Road, Armonk, New York, NY 10504 (US).

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **AUSSCHNITT, Christopher** [US/US]; 23 Wyman Road, Lexington, MA 02420 (US).

(74) Agent: **LI, Todd, M., C.**; International Business Machines Corporation, Zip 482, 2070 Route 52, Hopewell Junction, NY 12533 (US).

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(54) Title: **DIFFERENTIAL CRITICAL DIMENSION AND OVERLAY METROLOGY APPARATUS AND MEASUREMENT METHOD**

(57) Abstract: A method is described for measuring a dimension on a substrate, wherein a target pattern (455) is provided with a nominal characteristic dimension that repeats at a primary pitch of period  $P$ , and has a pre-determined variation orthogonal to the primary direction. The target pattern (455) formed on the substrate is then illuminated so that at least one non-zero diffracted order is detected. The response of the non-zero diffracted order to variation in the printed characteristic dimension relative to nominal is used to determine the dimension of interest, such as critical dimension or overlay, on the substrate. An apparatus (40) for performing the method of the present invention includes an illumination source (410), a detector (460) for detecting a non-zero diffracted order, and means for positioning the source (410) relative to the target (455) so that one or more non-zero diffracted orders from the target (455) are detected at the detector (460).



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